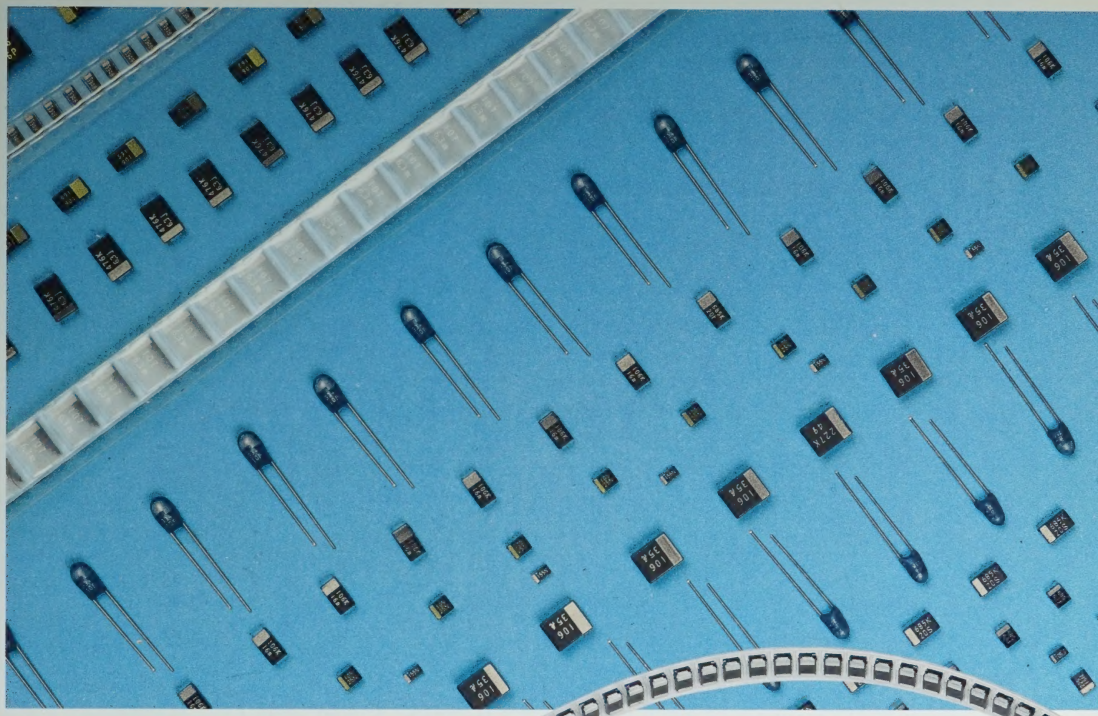
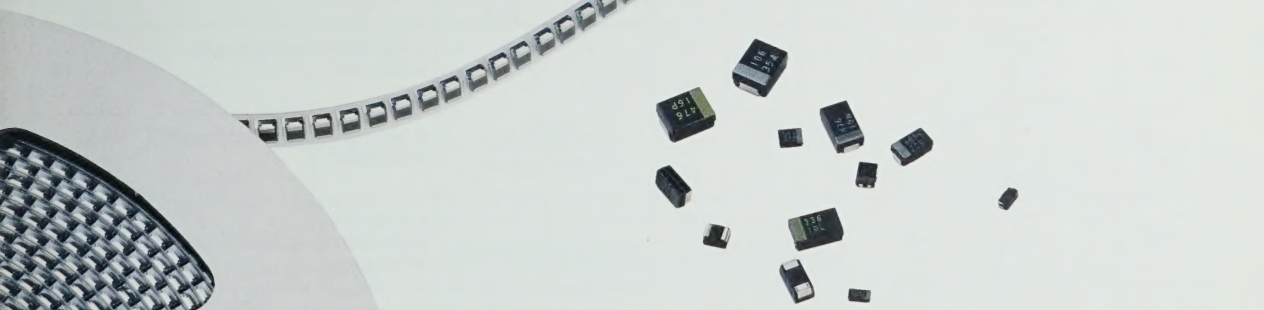
MATSUO

TANTALUM CAPACITORS





DESCRIPTION

MATSUO's Tantalum Capacitors, through many years of experience and expertise in manufacturing technology, offer high reliability and excellent performance characteristics with different types for coupling, de-coupling, blocking, by-passing, and R.C. timing circuits.

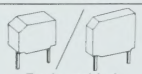
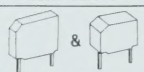
All types are widely used in such industrial products as Telecommunication, Automotive, Medical, Aerospace, and Computer electronics.

In recognizing the ever-changing demands of electronics, we utilize newly-developed production and test facilities and high technology to research, develop, and improve our products and service.

By this approach, we have built an established reputation for QUALITY in which we respond to the "Needs of Our Customers."

So when you need superior quality and high reliability, MATSUO's Tantalum Capacitors should be your "First Choice."

TABLE OF CONTENTS AND PRODUCT RANGES

Type	Configuration	F.R. Level	Cap. (μF) Range	Cap. Tol.	R.V. (VDC)	D.C. Leakage Current	Features and Applications	Page
267	Resin molded	M	0.1 ≀ 220	M K	4 ≀ 50	≤0.008CV or 0.4μA, whichever is greater.	● Sub-miniature size, automatic mounting ● Suitable for Hybid IC	2
267E	Resin molded	M	0.22 ≀ 150	M K	4 ≀ 50	≤0.01CV or 0.5μA, whichever is greater.	● Miniaturization extended range ● Suitable for Hybrid IC	4
269	Resin molded with fuse	M	1.0 ≀ 68	M	10 ≀ 50		● Built-in fuse ● Computer ● For power by-passing circuits	5
277	Resin molded with low profile	M	0.1 ≀ 6.8	M	4 ≀ 20		● Low Profile ● For IC Card	5
202	Resin dipped	L	0.1 ≀ 330	K (J)	3.15 ≀ 50		● Miniature ● Commercial & Industrial use	6
204	Resin dipped	M N	0.1 ≀ 470	M K (J)	3.15 ≀ 50	≤0.008CV or 0.4μA, whichever is greater.	● High Reliability ● Automotive Electronics use	8
242	Resin molded	M	0.1 ≀ 47	M (K)	6.3 ≀ 50	≤0.01CV or 0.5μA, whichever is greater.	● High-speed pulse by-passing ● Computer	10
242/ 244	 Resin molded	M	1 ≀ 3.3	M	16 ≀ 50		● Ultra high-speed pulse by-passing ● Computer	12
245	 Resin molded with fuse	M	1 ≀ 33	M	10 ≀ 50		● Built-in Fuse ● Ultra high-speed pulse by-passing ● Computer	12
Packaging for Automatic Insertion and Mounting Standard Packaging Quantities								14 15
Frequency Characteristics (TYPE 267) ■ ESR & Impedance vs Frequency ■ Capacitance & Dissipation Factor vs Frequency								16 17

ORDERING INFORMATION

Ex. **267** **M** **3502** **106** **M** **R** — □ □ □

267 — MATSUO TYPE NUMBER

M — FAILURE RATE
M: 1%/1000Hr.
or
E: FOR TYPE 267E SERIES

3502 — RATED VOLTAGE

CODE	VOLTS
3151	3.15
6301	6.3
1002	10
1602	16
2002	20
2502	25
3502	35
5002	50

106 — CAPACITANCE IN PICO FARADS
FIRST TWO DIGITS are significant figures. THIRD DIGIT is the number of zeros following.

M — CAPACITANCE TOLERANCE
M = ± 20%
K = ± 10%

R — PACKAGE STYLE

Code	Reel Diameter	Parts Orientation
R	7"	- facing feed hole
N	13"	
L	7"	+ facing feed hole
P	13"	

□ □ □

NOTE 1
* **EIA Designator Code** Add-"720" to the Part Number.

NOTE 2
* **Extended Range Code** Add-"533" to the Part Number.

NOTE 1
* **EIA Designator Code**
Applies to C3, D3 & E case sizes only per standard ratings chart on pages 2 & 4. (Even if extended range.)

NOTE 2
* **Extended Range Code**
Applies to those case sizes with the (*) added to the case size per the standard ratings chart on page 2.

Ex. **202** **L** **3502** **105** **K** **4**

202 — MATSUO TYPE NUMBER

L — FAILURE RATE
L: 2%/1000Hr.

3502 — RATED VOLTAGE

CODE	VOLTS
3151	3.15
6301	6.3
1002	10
1602	16
2002	20
2502	25
3502	35
5002	50

105 — CAPACITANCE IN PICO FARADS
FIRST TWO DIGITS are significant figures. THIRD DIGIT is the number of zeros following.

K — CAPACITANCE TOLERANCE
K = ± 10%
J = ± 5%

4 — LEAD STYLE
or
PACKAGE STYLE

Ex. **204** **M** **3502** **105** **M** **4**

204 — MATSUO TYPE NUMBER

M — FAILURE RATE
M: 1%/1000Hr.
N: 0.5%/1000Hr.

3502 — RATED VOLTAGE

CODE	VOLTS
3151	3.15
6301	6.3
1002	10
1602	16
2002	20
2502	25
3502	35
5002	50

105 — CAPACITANCE IN PICO FARADS
FIRST TWO DIGITS are significant figures. THIRD DIGIT is the number of zeros following.

M — CAPACITANCE TOLERANCE
M = ± 20%
K = ± 10%
J = ± 5%

4 — LEAD STYLE
or
PACKAGE STYLE

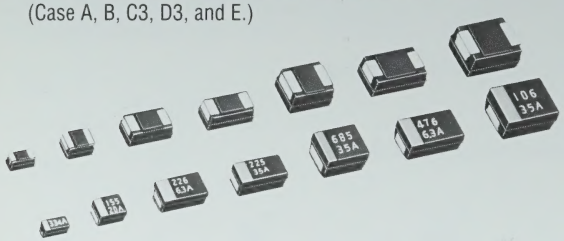
267 TANCHIP

SUB-MINIATURE MOLDED SOLID-ELECTROLYTE TANTALUM CHIP CAPACITORS

MATSUO Type 267 is specially designed for SMD (Surface Mounting Devices), for use in hybrid and low-profile printed circuit board applications.
Fully-molded construction provides excellent mechanical protection, superior moisture resistance, and high soldering heat resistance.

FEATURES:

- Ultra small dimensions (A case): 3.2 x 1.6mm
- Flame-retardant resin molded. Conforms to UL94V-0.
- Precise dimensions allow for high-density package.
- Reeled packaging is compatible with automatic mounting equipment per EIA-481. (See Page 15.)
- Failure Rate Level: M (1%/1000Hr.)
- Symmetrical construction of positive and negative terminals provides "Self-Alignment."
- Soldering: 260°C for 10 seconds by re-flow or dip.
- Dimensions are equivalent to EIA and IECQ standards. (Case A, B, C3, D3, and E.)



STANDARD RATINGS

RV (V) / Cap (µF)	4	6.3	10	16	20	25	35	50
0.1							A	A
0.15							A	*A,B
0.22							A	B
0.33							A	B
0.47						A	*A,B	*B,C,C_3
0.68					A	*A	B	C,C_3
1.0				A	*A		B	C,C_3
1.5			A	*A		B	*B,C,C_3	*C,*C_3,D,D_3
2.2		A	*A		B	*B	C,C_3	D,D_3
3.3	A	*A		B	*B	C_3	C,D_3	*D,*D_3
4.7	*A		B	*B	C_3	C,C_3	D,D_3	
6.8		B	*B	C_3	C,C_3	D_3	D,D_3	
10.0	B	*B	C_3	C,C_3	*C	D,D_3	E	
15.0	*B	C_3	C	*C,*C_3	D,D_3		E	
22.0	C_3	C	*C,*C_3	D,D_3	*D,*D_3	E		
33.0	C,C_3	*C,*C_3	D,D_3	*D,*D_3	E			
47.0	*C,*C_3	D,D_3	*D,*D_3	E				
68.0	D,D_3	*D,*D_3	E					
100.0	*D,*D_3	E	*E					
150.0	E	*E						
220.0	*E							

NOTE: * = Designates Extended Range. Add "-533" to Part Number for c/s A, B, C, D.
"-720" = Designates the following EIA case sizes only: C_3, D_3, E. (even if Extended Range).

RATINGS AND CATALOG NUMBERS

Cap. (µF)	Catalog Number	Case Code	DCL 25°C (µA)	D.F. 25°C
4VDC				
3.3	267 M 4001 335 □[1] □[2]	A	0.4	0.06
4.7	267 M 4001 475 □ □	A	0.4	0.06
10.0	267 M 4001 106 □ □	B	0.4	0.06
15.0	267 M 4001 156 □ □	B	0.5	0.06
22.0	267 M 4001 226 □ □	C_3	0.7	0.06
33.0	267 M 4001 336 □ □	C, C_3	1.1	0.06
47.0	267 M 4001 476 □ □	C, C_3	1.5	0.06
68.0	267 M 4001 686 □ □	D, D_3	2.2	0.06
100.0	267 M 4001 107 □ □	D, D_3	3.2	0.08
150.0	267 M 4001 157 □ □	E	4.8	0.08
220.0	267 M 4001 227 □ □	E	7.0	0.08
6.3VDC				
2.2	267 M 6301 225 □ □	A	0.4	0.06
3.3	267 M 6301 335 □ □	A	0.4	0.06
6.8	267 M 6301 685 □ □	B	0.4	0.06
10.0	267 M 6301 106 □ □	B	0.5	0.06
15.0	267 M 6301 156 □ □	C_3	0.8	0.06
22.0	267 M 6301 226 □ □	C	1.1	0.06
33.0	267 M 6301 336 □ □	C, C_3	1.7	0.06
47.0	267 M 6301 476 □ □	D, D_3	2.4	0.06
68.0	267 M 6301 686 □ □	D, D_3	3.4	0.06
100.0	267 M 6301 107 □ □	E	5.0	0.08
150.0	267 M 6301 157 □ □	E	7.6	0.08
10VDC				
1.5	267 M 1002 155 □ □	A	0.4	0.06
2.2	267 M 1002 225 □ □	A	0.4	0.06
4.7	267 M 1002 475 □ □	B	0.4	0.06
6.8	267 M 1002 685 □ □	B	0.5	0.06
10.0	267 M 1002 106 □ □	C_3	0.8	0.06
15.0	267 M 1002 156 □ □	C	1.2	0.06
22.0	267 M 1002 226 □ □	C, C_3	1.8	0.06
33.0	267 M 1002 336 □ □	D, D_3	2.6	0.06
47.0	267 M 1002 476 □ □	D, D_3	3.8	0.06
68.0	267 M 1002 686 □ □	E	5.4	0.06
100.0	267 M 1002 107 □ □	E	8.0	0.08
16VDC				
1.0	267 M 1602 105 □ □	A	0.4	0.04
1.5	267 M 1602 155 □ □	A	0.4	0.06
3.3	267 M 1602 335 □ □	B	0.4	0.06
4.7	267 M 1602 475 □ □	B	0.6	0.06
6.8	267 M 1602 685 □ □	C_3	0.9	0.06
10.0	267 M 1602 106 □ □	C, C_3	1.3	0.06
15.0	267 M 1602 156 □ □	C, C_3	1.9	0.06
22.0	267 M 1602 226 □ □	D, D_3	2.8	0.06
33.0	267 M 1602 336 □ □	D, D_3	4.2	0.06
47.0	267 M 1602 476 □ □	E	6.0	0.06

Cap. (µF)	Catalog Number	Case Code	DCL 25°C (µA)	D.F. 25°C
20VDC				
0.68	267 M 2002 684 □[1] □[2]	A	0.4	0.04
1.0	267 M 2002 105 □ □	A	0.4	0.04
2.2	267 M 2002 225 □ □	B	0.4	0.06
3.3	267 M 2002 335 □ □	B	0.5	0.06
4.7	267 M 2002 475 □ □	C_3	0.8	0.06
6.8	267 M 2002 685 □ □	C, C_3	1.1	0.06
10.0	267 M 2002 106 □ □	C	1.6	0.06
15.0	267 M 2002 156 □ □	D, D_3	2.4	0.06
22.0	267 M 2002 226 □ □	D, D_3	3.5	0.06
33.0	267 M 2002 336 □ □	E	5.3	0.06
25VDC				
0.47	267 M 2502 474 □ □	A	0.4	0.04
0.68	267 M 2502 684 □ □	A	0.4	0.04
1.5	267 M 2502 155 □ □	B	0.4	0.06
2.2	267 M 2502 225 □ □	B	0.4	0.06
3.3	267 M 2502 335 □ □	C_3	0.7	0.06
4.7	267 M 2502 475 □ □	C, C_3	0.9	0.06
6.8	267 M 2502 685 □ □	D_3	1.4	0.06
10.0	267 M 2502 106 □ □	D, D_3	2.0	0.06
22.0	267 M 2502 226 □ □	E	4.4	0.06
35VDC				
0.1	267 M 3502 104 □ □	A	0.4	0.04
0.15	267 M 3502 154 □ □	A	0.4	0.04
0.22	267 M 3502 224 □ □	A	0.4	0.04
0.33	267 M 3502 334 □ □	A	0.4	0.04
0.47	267 M 3502 474 □ □	A, B	0.4	0.04
0.68	267 M 3502 684 □ □	B	0.4	0.04
1.0	267 M 3502 105 □ □	B	0.4	0.04
1.5	267 M 3502 155 □ □	B, C, C_3	0.4	0.06
2.2	267 M 3502 225 □ □	C, C_3	0.6	0.06
3.3	267 M 3502 335 □ □	C, D_3	0.9	0.06
4.7	267 M 3502 475 □ □	D, D_3	1.3	0.06
6.8	267 M 3502 685 □ □	D, D_3	1.9	0.06
10.0	267 M 3502 106 □ □	E	2.8	0.06
15.0	267 M 3502 156 □ □	E	4.2	0.06
50VDC				
0.1	267 M 5002 104 □ □	A	0.4	0.04
0.15	267 M 5002 154 □ □	A, B	0.4	0.04
0.22	267 M 5002 224 □ □	B	0.4	0.04
0.33	267 M 5002 334 □ □	B	0.4	0.04
0.47	267 M 5002 474 □ □	B, C, C_3	0.4	0.04
0.68	267 M 5002 684 □ □	C, C_3	0.4	0.04
1.0	267 M 5002 105 □ □	C, C_3	0.4	0.04
1.5	267 M 5002 155 □ □	C, C3, D, D_3	0.6	0.06
2.2	267 M 5002 225 □ □	D, D_3	0.9	0.06
3.3	267 M 5002 335 □ □	D, D_3	1.4	0.06

When ordering, insert "Capacitance Tolerance" in □[1], and "L" or "R" in □[2] for packaging.

SPECIFICATIONS

Operating Temperature Range: -55°C to +125°C (For operation at 125°C, derate voltage linearly to 67% of 85°C voltage rating.)
Rated Voltage: 4, 6.3, 10, 16, 20, 25, 35, 50 VDC
Capacitance Tolerance: ±20% (M), ±10% (K)
DC Leakage Current: 0.008 x CV or 0.4μA, whichever is greater. (Rated voltage, 5 minutes, 25°C)
Dissipation Factor: See Table 1 (at 120Hz).

Surge Voltage — Table 2

DC Rated Voltage at 85°C	4	6.3	10	16	20	25	35	50
DC Surge Voltage at 85°C	5	8	13	20	25	32	44	63

Capacitor shall withstand the surge voltage applied in series with a 1000 ohm resistor at the rate of 1/2 minute on, 5 1/2 minutes off, for 1000 successive test cycles at 85°C. After test, capacitors shall meet the requirements in Table 3.

Table 3

Capacitance Change	Shall not change more than ±5%
Dissipation Factor	Shall meet initial requirements in Table 1.
DC Leakage Current	Shall meet initial requirements in Table 1.

Stability at Low and High Temperatures
Capacitors shall meet the requirements in Table 4.

Table 4

TEMP	CAPACITANCE CHANGE	DC LEAKAGE CURRENT	DISSIPATION FACTOR	
-55°C	Within ±10% of initial value.	———	0.1 to 1.0μF 1.5 to 68μF 100 to 220μF	0.05 max. 0.08 max 0.10 max.
+88°C	Within ±10% of initial value.	Less than 10 times in Table 1.	0.1 to 1.0μF 1.5 to 68μF 100 to 220μF	0.04 max. 0.06 max. 0.08 max.
+125°C	Within ±15% of initial value.	0.125 x CV or 6.25μA, whichever is greater.	0.1 to 1.0μF 1.5 to 68μF 100 to 220μF	0.05 max. 0.06 max. 0.08 max.

Moisture Resistance
After 1350 hours (56 days) at 40°C, 95% R.H., with no voltage applied, capacitors shall meet the requirements in Table 5.

Table 5

Capacitance Change	Within ±5% of initial value.
Dissipation Factor	Shall meet initial requirements in Table 1.
DC Leakage Current	Shall meet initial requirements in Table 1.

Thermal Shock Test (Resistance to Soldering Heat)
After soldering at 260°C for 10 seconds either by re-flow or dip, capacitors shall meet the requirements in Table 6.

Table 6

Capacitance Change	Within ±3% of initial value.
Dissipation Factor	Shall meet initial requirements in Table 1.
DC Leakage Current	Shall meet initial requirements in Table 1.

Life Test
After 2000 hours at 85°C with DC rated voltage applied, capacitors shall meet the requirements in Table 7.

Table 7

Capacitance Change	Within ±10% of initial value.
Dissipation Factor	Within initial requirement specified in Table 1.
DC Leakage Current	125% max. of initial value specified in Table 1.

Flammability
Capacitor resin (plastic material) shall conform to the requirements of UL94V-0.

Packaging:
See page 15.

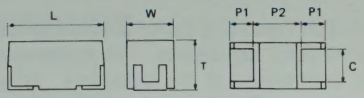
Frequency Characteristics:
See page 16, 17.

For further details, refer to the latest issue of Engineering Bulletin E-100-001 A.

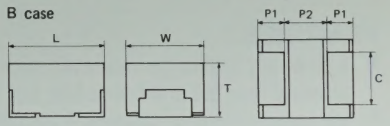
DIMENSIONS

Inches (mm)

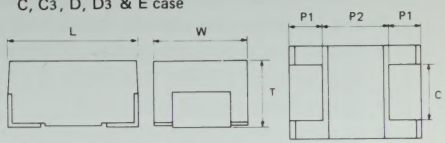
A case



B case

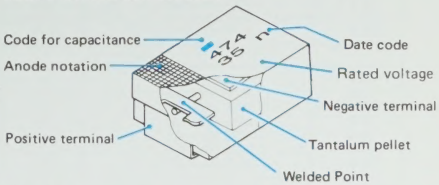


C, C3, D, D3 & E case



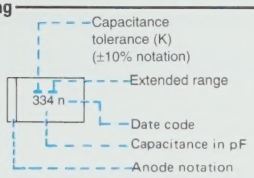
Case Code	EIA Code	L ±.008 (0.2)	W ±.008 (0.2)	T ±.008 (0.2)	P1 ±.008 (0.2)	P_2 min.	C ±.004 (0.1)
A	3216	.126 (3.2)	.063 (1.6)	.063 (1.6)	.030 (0.75)	.056 (1.4)	.047 (1.2)
B	3528	.138 (3.5)	.110 (2.8)	.075 (1.9)	.031 (0.8)	.059 (1.5)	.087 (2.2)
C	—	.220 (5.6)	.130 (3.3)	.091 (2.3)	.051 (1.3)	.110 (2.8)	.087 (2.2)
C_3	6032	.236 (6.0)	.126 (3.2)	.098 (2.5)	.051 (1.3)	.118 (3.0)	.087 (2.2)
D	—	.220 (5.6)	.181 (4.6)	.126 (3.2)	.051 (1.3)	.110 (2.8)	.126 (3.2)
D_3	7343	.287 (7.3)	.173 (4.4)	.110 (2.8)	.051 (1.3)	.157 (4.0)	.094 (2.4)
E	7257	.287 (7.3)	.228 (5.8)	.138 (3.5)	.051 (1.3)	.157 (4.0)	.138 (3.5)

CONSTRUCTION and MARKING

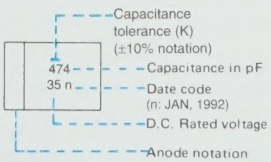


Marking

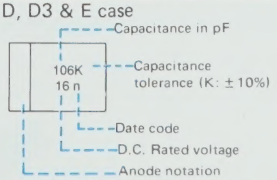
A case



B case



C, C3, D, D3 & E case



267 TANCHIP E SERIES

MINIATURIZED MOLDED SOLID-ELECTROLYTE TANTALUM CHIP CAPACITORS

MATSUO Type 267 E Series is specially designed for SMD (Surface Mounting Devices), for use in hybrid and low-profile printed circuit board applications. This series was developed using high CV Tantalum powder and is a result of our continuous study in the development of this technology. Fully-molded construction provides excellent mechanical protection, superior moisture resistance and high soldering heat resistance.

FEATURES:

- E Series has 3 times the volumetric efficiency of our Standard Type 267 in the same case size .
- Ultra small dimension (A case): 3.2 x 1.6mm
- Flame-retardant resin molded. Conforms to UL94V-0.
- Precise dimensions allow for high density package.
- Reeled packaging is compatible with automatic mounting equipment per EIA-481. (See Page 15.)
- Failure Rate Level: M (1%/1000hr.)
- Symmetrical construction of positive and negative terminals provides "Self-Alignment."
- Soldering: 260°C for 10 seconds by re-flow or dip.
- Dimensions are equivalent to EIA and IECQ standards. (Case A, B, C3, and D3.)

STANDARD RATINGS

RV (V) / Cap (μF)	4	6.3	10	16	20	25	35	50
0.22								A
0.68							A	B
1.0						A		
1.5					A			
2.2				A			B	C_3
3.3			A	A		B		
4.7		A	A		B			
6.8	A	A		B				
10.0	A	A	B	B				
15.0	A	B	B					
22.0	B	B						
33.0	B		C, C_3					
47.0		C, C_3						
68.0	C, C_3		D, D_3					
100.0		D, D_3						
150.0	D, D_3							

NOTE:
"-720" designates the following EIA cases only: C_3, D_3.

RATINGS AND CATALOG NUMBERS

Table 1

Cap. (μF)	Catalog Number	Case Code	DCL 25°C (μA)	D.F. 25°C
4VDC				
6.8	267E 4001 685 □[1] □[2]	A	0.5	0.06
10.0	267E 4001 106 □ □	A	0.5	0.06
15.0	267E 4001 156 □ □	A	0.6	0.06
22.0	267E 4001 226 □ □	B	0.9	0.06
33.0	267E 4001 336 □ □	B	1.3	0.06
68.0	267E 4001 686 □ □	C, C_3	2.7	0.06
150.0	267E 4001 157 □ □	D, D_3	6.0	0.08
6.3VDC				
4.7	267E 6301 475 □ □	A	0.5	0.06
6.8	267E 6301 685 □ □	A	0.5	0.06
10.0	267E 6301 106 □ □	A	0.7	0.06
15.0	267E 6301 156 □ □	B	1.0	0.06
22.0	267E 6301 226 □ □	B	1.4	0.06
47.0	267E 6301 476 □ □	C, C_3	3.0	0.06
100.0	267E 6301 107 □ □	D, D_3	6.3	0.08
10VDC				
3.3	267E 1002 335 □ □	A	0.5	0.06
4.7	267E 1002 475 □ □	A	0.5	0.06
10.0	267E 1002 106 □ □	B	1.0	0.06
15.0	267E 1002 156 □ □	B	1.5	0.06
33.0	267E 1002 336 □ □	C, C_3	3.3	0.06
68.0	267E 1002 686 □ □	D, D_3	6.8	0.06

Cap. (μF)	Catalog Number	Case Code	DCL 25°C (μA)	D.F. 25°C
16VDC				
2.2	267E 1602 225 □[1] □[2]	A	0.5	0.06
3.3	267E 1602 335 □ □	A	0.6	0.06
6.8	267E 1602 685 □ □	B	1.1	0.06
10.0	267E 1602 106 □ □	B	1.6	0.06
20VDC				
1.5	267E 2002 155 □ □	A	0.5	0.06
4.7	267E 2002 475 □ □	B	1.0	0.06
25VDC				
1.0	267E 2502 105 □ □	A	0.5	0.04
3.3	267E 2502 335 □ □	B	0.9	0.06
35VDC				
0.68	267E 3502 684 □ □	A	0.5	0.04
2.2	267E 3502 225 □ □	B	0.8	0.06
50VDC				
0.22	267E 5002 224 □ □	A	0.5	0.04
0.68	267E 5002 684 □ □	B	0.5	0.04
2.2	267E 5002 225 □ □	C_3	1.1	0.06

When ordering, insert "Capacitance Tolerance" in □[1] and "L" or "R" in □[2] for packaging.

SPECIFICATIONS

Operating Temperature Range: -55°C to +125°C (For operation at 125°C, derate voltage linearly to 67% of 85°C voltage rating.)

Rated Voltage: 4, 6.3, 10, 16, 20, 25, 35, 50 VDC

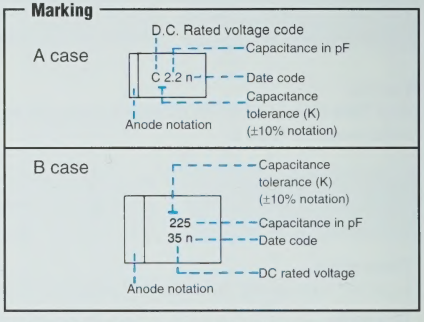
Capacitance Tolerance: ±20% (M), ±10% (K)

DC Leakage Current: 0.01 x CV or 0.5μA, whichever is greater. (Rated voltage, 5 minutes, 25°C)

Dissipation Factor: See Table 1 (at 120Hz).

*Other specifications and dimensions are same as Standard Type 267, (see page 3).

Marking



Marking of Case size C, C_3, D and D_3 is the same as type 267M's. (See page 3)

NOTE: DC RATED VOLTAGE CODES

DC R/V	4	6.3	10	16	20	25	35	50
CODE	G	J	A	C	D	E	V	H

269 (BUILT-IN FUSE)

SOLID TANTALUM CAPACITORS TANCHIP® SERIES

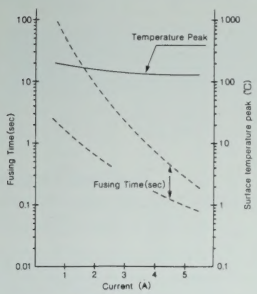
MATSUO Type 269 is specially designed as a surface mount component for use in hybrid and low profile print circuit board applications.

The built-in fuse functions either as a thermal fuse under small current or as an electric fuse under larger currents.

SPECIFICATIONS:

Operating Temperature Range:	-55°C to +125°C (For operation at 125°C, derate voltage linearly to 67% of 85°C voltage rating.)
Rated Voltage:	10, 16, 20, 25, 35, 50 VDC
Capacitance Range:	1.0μF to 68μF
Capacitance Tolerance:	±20% (M)
DC Leakage Current:	0.01 x CV or 0.5μA, whicheyer is greater. (Rated voltage, 5 minutes, 25°C)
Failure Rate Level:	M (1%/1000hr.)
Dissipation Factor:	0.04 max. (1.0μF)
	0.06 max. (1.5~68μF)

FUSING CHARACTERISTICS (case code B)

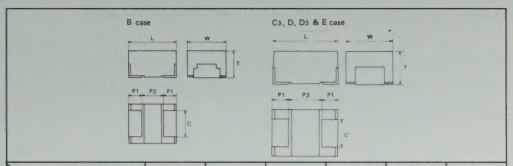


The fusing characteristic shown at the left is only an example. They vary according to conditions.

In fusing, a little fuming and exposure of inside material may occur.

DIMENSIONS:

Inches (mm)



R.V. (VDC) / Cap. (μF)	10	16	20	25	35	50
1.0				B	B,C_3	C_3
1.5			B	B	C_3	C_3
2.2		B	B		C_3	D_3
3.3		B		C_3	D,D_3	D_3
4.7	B		C_3		D,D_3	
6.8		C_3	C_3	D,D_3	E	
10.0	C_3	C_3	D,D_3		E	
15.0	C_3	D,D_3		E		
22.0		D,D_3	E			
33.0	D,D_3	E				
47.0		E				
68.0	E					

Case Code	EIA Code	L ± 008 (0.2)	W ± 008 (0.2)	T ± 008 (0.2)	P1 ± 008 (0.2)	P2 min.	C ± 004 (0.1)
B	3528	.138 (3.5)	.110 (2.8)	.075 (1.9)	.031 (0.8)	.059 (1.5)	.087 (2.2)
C_3	6032	.236 (6.0)	.126 (3.2)	.098 (2.5)	.051 (1.3)	.118 (3.0)	.087 (2.2)
D	—	.220 (5.6)	.181 (4.6)	.126 (3.2)	.051 (1.3)	.110 (2.8)	.126 (3.2)
D_3	7343	.287 (7.3)	.173 (4.4)	.110 (2.8)	.051 (1.3)	.157 (4.0)	.094 (2.4)
E	7257	.287 (7.3)	.228 (5.8)	.138 (3.5)	.051 (1.3)	.157 (4.0)	.138 (3.5)

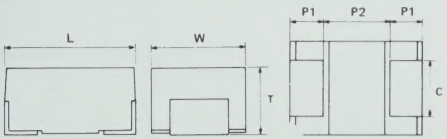
277 (LOW PROFILE)

SOLID TANTALUM CAPACITORS TANCHIP® SERIES

Type 277 is especially designed to meet low profile applications. The height is reduced to 1.2mm (.047) max.

SPECIFICATIONS:

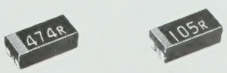
Operating temperature range:	-55 ~ +85°C to +125°C with voltage derating
Rated voltage:	4, 6.3, 10, 16, 20 VDC
Capacitance range:	0.1 to 6.8 μF
Capacitance tolerance:	±20% (M)
Leakage current:	0.01 CV or 0.5μA, whichever is greater.
Failure rate level:	M (1%/1000Hr.)
Dissipation factor:	0.04 max. (0.1 ~ 1.0 μF)
	0.06 max. (1.5 ~ 6.8 μF)



RV (VDC) / Cap (μF)	4	6.3	10	16	20
0.1					A
0.15					A
0.22					A
0.33					A
0.47					A
0.68				A	B
1.0			A		B
1.5		A			B
2.2	A			B	
3.3	A		B		
4.7		B			
6.8	B				

DIMENSIONS:

Case Code	EIA Code	L ± 008 (0.2)	W ± 008 (0.2)	T ± 008 (0.2)	P_1 ± 008 (0.2)	P_2 min.	C ± 004 (0.1)
A	3216	.126 (3.2)	.063 (1.6)	.047 (1.2)	.031 (0.8)	.056 (1.4)	.047 (1.2)
B	3528	.138 (3.5)	.110 (2.8)	.047 (1.2)	.031 (0.8)	.059 (1.5)	.087 (2.2)



202 BLUEDT® SERIES

MINIATURE DIPPED SOLID – ELECTROLYTE TANTALUM CAPACITORS

BLUEDT® Series Type 202 is designed to take advantage of high purity Tantalum Powder resulting in smaller size units and minimum cost.

Available capacitance values range from 0.1 to 330µF in 10 case sizes and voltage range is 3.15 to 50VDC at 85°C.

Type 202 exhibits very low leakage current (spec. limit: 0.01 CV or 0.5µA), as low as 1/10 to 1/100 of specification. Moreover, it exhibits excellent stability with both temperature and time, with a very limited distribution. It is ideal for by-passing, coupling and timing applications.

STANDARD RATINGS

RV (V) / Cap (µF)	3.15	6.3	10	16	20	25	35	50
0.1							1	2
0.15							1	2
0.22							1	2
0.33							1	2
0.47							1	2
0.68							1	2
1.0							1	3
1.5						1	2	4
2.2					1	2	3	5
3.3				1	2	3	4	6
4.7			1	2	3	4	5	
6.8		1	2	3	4	5	6	
10.0	1	2	3	4	5	6	7	
15.0	2	3	4	5	6	7	8B	
22.0	3	4	5	6	7	8B	9	
33.0	4	5	6	7	8B	9	10B	
47.0	5	6	7	8B	9	10B		
68.0	6	7	8B	9	10B			
100.0	7	8A	9	10B				
150.0	8A	9	10B					
220.0	9	10A						
330.0	10A							

STANDARD RATINGS

Cap. (µF)	Catalog Number	Case Code	DCL 25°C (µA)	D.F. 25°C
	3.15VDC			
10.0	202 L3151 106 K ☐	1	0.5	0.08
15.0	202 L3151 156 K ☐	2	0.5	0.08
22.0	202 L3151 226 K ☐	3	0.7	0.08
33.0	202 L3151 336 K ☐	4	1.0	0.08
47.0	202 L3151 476 K ☐	5	1.5	0.08
68.0	202 L3151 686 K ☐	6	2.1	0.08
100.0	202 L3151 107 K ☐	7	3.2	0.10
150.0	202 L3151 157 K ☐	8A	4.7	0.10
220.0	202 L3151 227 K ☐	9	6.9	0.10
330.0	202 L3151 337 K ☐	10A	10.4	0.10
	6.3VDC			
6.8	202 L6301 685 K ☐	1	0.5	0.08
10.0	202 L6301 106 K ☐	2	0.6	0.08
15.0	202 L6301 156 K ☐	3	0.9	0.08
22.0	202 L6301 226 K ☐	4	1.4	0.08
33.0	202 L6301 336 K ☐	5	2.1	0.08
47.0	202 L6301 476 K ☐	6	3.0	0.08
68.0	202 L6301 686 K ☐	7	4.3	0.08
100.0	202 L6301 107 K ☐	8A	6.3	0.10
150.0	202 L6301 157 K ☐	9	9.5	0.10
220.0	202 L6301 227 K ☐	10A	13.9	0.10
	10VDC			
4.7	202 L1002 475K ☐	1	0.5	0.06
6.8	202 L1002 685K ☐	2	0.7	0.08
10.0	202 L1002 106K ☐	3	1.0	0.08
15.0	202 L1002 156K ☐	4	1.5	0.08
22.0	202 L1002 226K ☐	5	2.2	0.08
33.0	202 L1002 336K ☐	6	3.3	0.08
47.0	202 L1002 476K ☐	7	4.7	0.08
68.0	202 L1002 686K ☐	8B	6.8	0.08
100.0	202 L1002 107K ☐	9	10.0	0.10
150.0	202 L1002 157K ☐	10B	15.0	0.10
	16VDC			
3.3	202 L1602 335K ☐	1	0.5	0.06
4.7	202 L1602 475K ☐	2	0.8	0.06
6.8	202 L1602 685K ☐	3	1.1	0.08
10.0	202 L1602 106K ☐	4	1.6	0.08
15.0	202 L1602 156K ☐	5	2.4	0.08
22.0	202 L1602 226K ☐	6	3.5	0.08
33.0	202 L1602 336K ☐	7	5.3	0.08
47.0	202 L1602 476K ☐	8B	7.5	0.08
68.0	202 L1602 686K ☐	9	10.9	0.08
100.0	202 L1602 107K ☐	10B	16.0	0.10

When ordering, insert "Lead style" or "Packaging Style" in ☐.

Cap. (µF)	Catalog Number	Case Code	DCL 25°C (µA)	D.F. 25°C
	20VDC			
2.2	202 L2002 225K ☐	1	0.5	0.06
3.3	202 L2002 335K ☐	2	0.7	0.06
4.7	202 L2002 475K ☐	3	0.9	0.06
6.8	202 L2002 685K ☐	4	1.4	0.08
10.0	202 L2002 106K ☐	5	2.0	0.08
15.0	202 L2002 156K ☐	6	3.0	0.08
22.0	202 L2002 226K ☐	7	4.4	0.08
33.0	202 L2002 336K ☐	8B	6.6	0.08
47.0	202 L2002 476K ☐	9	9.4	0.08
68.0	202 L2002 686K ☐	10B	13.6	0.08
	25VDC			
1.5	202 L2502 155K ☐	1	0.5	0.06
2.2	202 L2502 225K ☐	2	0.6	0.06
3.3	202 L2502 335K ☐	3	0.8	0.06
4.7	202 L2502 475K ☐	4	1.2	0.06
6.8	202 L2502 685K ☐	5	1.7	0.08
10.0	202 L2502 106K ☐	6	2.5	0.08
15.0	202 L2502 156K ☐	7	3.8	0.08
22.0	202 L2502 226K ☐	8B	5.5	0.08
33.0	202 L2502 336K ☐	9	8.3	0.08
47.0	202 L2502 476K ☐	10B	11.8	0.08
	35VDC			
0.1	202 L3502 104K ☐	1	0.5	0.04
0.15	202 L3502 154K ☐	1	0.5	0.04
0.22	202 L3502 224K ☐	1	0.5	0.04
0.33	202 L3502 334K ☐	1	0.5	0.04
0.47	202 L3502 474K ☐	1	0.5	0.04
0.68	202 L3502 684K ☐	1	0.5	0.04
1.0	202 L3502 105K ☐	1	0.5	0.06
1.5	202 L3502 155K ☐	2	0.5	0.06
2.2	202 L3502 225K ☐	3	0.8	0.06
3.3	202 L3502 335K ☐	4	1.2	0.06
4.7	202 L3502 475K ☐	5	1.6	0.06
6.8	202 L3502 685K ☐	6	2.4	0.08
10.0	202 L3502 106K ☐	7	3.5	0.08
15.0	202 L3502 156K ☐	8B	5.3	0.08
22.0	202 L3502 226K ☐	9	7.7	0.08
33.0	202 L3502 336K ☐	10B	11.6	0.08
	50VDC			
0.1	202 L5002 104K ☐	2	0.5	0.04
0.15	202 L5002 154K ☐	2	0.5	0.04
0.22	202 L5002 224K ☐	2	0.5	0.04
0.33	202 L5002 334K ☐	2	0.5	0.04
0.47	202 L5002 474K ☐	2	0.5	0.04
0.68	202 L5002 684K ☐	2	0.5	0.04
1.0	202 L5002 105K ☐	3	0.5	0.04
1.5	202 L5002 155K ☐	4	0.8	0.06
2.2	202 L5002 225K ☐	5	1.1	0.06
3.3	202 L5002 335K ☐	6	1.7	0.06

SPECIFICATIONS

Operating Temperature Range: -55°C to +85°C
Rated Voltage: 3.15, 6.3, 10, 16, 20, 25, 35, and 50 VDC
Capacitance Range: 0.1 to 330 µF
Capacitance Tolerance: ±10% (K), ±5% (J)
DC Leakage Current: 0.01 x CV or 0.5µA, whichever is greater, (Rated Voltage, 5 min. 25°C)
Dissipation Factor: See Table 1 (at 120Hz)

Surge Voltage — Table 2

DC Rated Voltage at 85°C	3.15	6.3	10	16	20	25	35	50
DC Surge Voltage at 85°C	4	8	13	20	25	32	44	63

Capacitors shall withstand the surge voltage applied in series with a 1000-ohm resistor at the rate of 1/2 minute on, 5 1/2 minutes off, for 1000 successive test cycles at 85°C. After test, capacitors shall meet the requirements in Table 3.

Table 3

Capacitance Change	Shall not change more than ±5%.
Dissipation Factor	Shall meet initial requirements in Table 1.
DC Leakage Current	Shall meet initial requirements in Table 1.

Stability at Low and High Temperatures
Capacitors shall meet the requirements in Table 4.

Table 4

STEP	TEMP	CAPACITANCE CHANGE	DC LEAKAGE CURRENT	DISSIPATION FACTOR			
				0.1 to 1.0µF	1.5 to 4.7µF	6.8 to 68µF	100µF
1	+25°C	—	See Table 1.	<0.04	<0.06	<0.08	<0.10
2	-55°C	Within ±12% of initial value.	—	<0.05	<0.08	<0.11	<0.12
3	+25°C	Within ±3% of initial value.	See Table 1.	<0.04	<0.06	<0.08	<0.10
4	+85°C	Within ±12% of initial value.	Less than 10 times value in table	<0.04	<0.06	<0.08	<0.10
5	+25°C	Within ±3% of initial value.	See Table 1.	<0.04	<0.06	<0.08	<0.10

Moisture Resistance
After 500 hours (21 days) at 40°C, 95% RH with no voltage applied, capacitors shall meet the requirements in Table 5.

Table 5

Capacitance Change	Within ±5% of initial value.
Dissipation Factor	Shall meet initial requirements in Table 1.
DC Leakage Current	Shall meet initial requirements in Table 1.

Life Test
After 2000 hours at 85°C with DC rated voltage applied, capacitors shall meet the requirements in Table 6.

Table 6

Capacitance Change	Within ±10% of initial value.
Dissipation Factor	Shall meet initial requirements specified in Table 1.
DC Leakage Current:	125% max. of initial value specified in Table 1.

Flammability
Capacitor resin (plastic material) shall conform to the requirements of UL94V-0.

Terminal Strength
Capacitor leads shall withstand a pull of 0.5kg for 10 seconds and 2 bends (90°).

Reverse Voltage
Allowable voltage 10% of rated voltage or 0.5 volts, whichever is greater, at 25°C. At 85°C, allowable reverse voltage is 3% of rated voltage or 0.5 volts, whichever is greater.

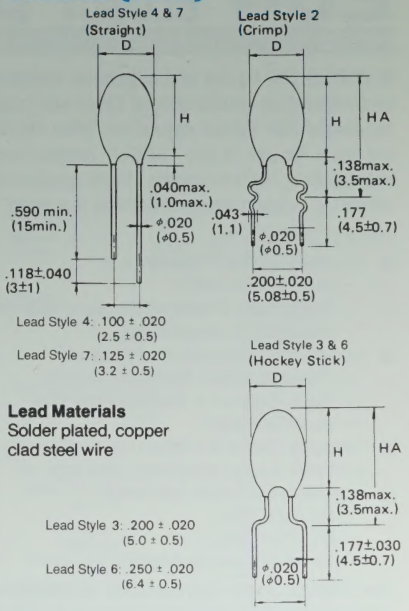
Permissible Ripple Voltage
The sum of the applied DC voltage plus the peak AC voltage shall not exceed the DC rated voltage of the capacitor.

Resistance to Soldering Heat
The optimum soldering temperature and time ranges are 260°C and 4 seconds.

For further details, refer to the latest issue of Engineering Bulletin E-100-001 A.

DIMENSIONS:

Inches (mm)



Lead Materials
Solder plated, copper clad steel wire

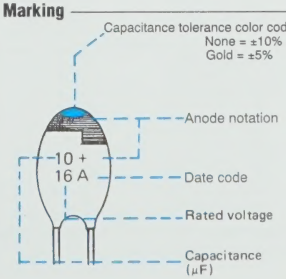
	3.15VDC ~ 35VDC			50VDC		
Case Size	D max.	H max.	HA max.	D max.	H max.	HA max.
1	.142 (3.6)	.236 (6.0)	.374 (9.5)	—	—	—
2	.150 (3.8)	.256 (6.5)	.394 (10.0)	.150 (3.8)	.276 (7.0)	.414 (10.5)
3	.157 (4.0)	.276 (7.0)	.414 (10.5)	.157 (4.0)	.295 (7.5)	.433 (11.0)
4	.189 (4.8)	.295 (7.5)	.433 (11.0)	.189 (4.8)	.315 (8.0)	.453 (11.5)
5	.197 (5.0)	.315 (8.0)	.453 (11.5)	.197 (5.0)	.335 (8.5)	.473 (12.0)
6	.217 (5.5)	.335 (8.5)	.473 (12.0)	.217 (5.5)	.374 (9.5)	.512 (13.0)
7	.217 (5.5)	.374 (9.5)	.512 (13.0)			
8	.256 (6.5)	.453 (11.5)	.591 (15.0)			
9	.295 (7.5)	.512 (13.0)	.650 (16.5)			
10	.315 (8.0)	.551 (14.0)	.689 (17.5)			

Tape Packaging Style

Code	Lead Spacing	Polarity	Style
H	100 + .020 (2.5 + 0.5)	(+) proceeding	Reeled
J		(-) proceeding	Reeled
G		—	Ammo
C	.200 + .020 (5.0 + 0.5)	(+) proceeding	Reeled
F		(-) proceeding	Reeled
B		—	Ammo

PACKAGING QUANTITIES: See page 15.

Marking

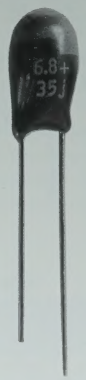


V	Code
3.15	F
4	G
6.3	J
10	A
16	C
20	D
25	E
35	V
50	H

204 BLUEDT® SERIES

DIPPED SOLID-ELECTROLYTE TANTALUM CAPACITORS (High Reliability)

BLUEDT® 204 Series is designed to maintain high reliability and electrical performance characteristics. These high reliability 204 Series capacitors offer small case sizes and are ideal for use in any "Hi-Rel" product such as automotive electronics, telecommunications equipment, or any other industrial product where reliability is a must.



FEATURES:

- Excellent Electrical Performance.
  - — Low Leakage Current.
  - — Highly Stable Characteristics over a wide range of frequencies & temperatures.
- Hard Insulating Epoxy Resin Coating.
  - — Protection against Mechanical Damage.
  - — Highly Resistant to Moisture Absorbtion
  - — Flame Retartdant
- Packaging (Reeled & Ammo) is compatible with automatic insertion equipment. (See page 14.)
- High Reliability (Failure Rate Level):
  - — M (1%/1000hr.)
  - — N (0.5%/1000hr.)
  - (Except 50V and Case Code 11)

STANDARD RATINGS

RV (V) / Cap (µF)	3.15	6.3	10	16	20	25	35	50
0.1							1	2
0.15							1	2
0.22							1	2
0.33							1	2
0.47							1	2
0.68							1	2
1.0							1	3
1.5						1	2	4
2.2					1	2	3	5
3.3				1	2	3	4	6
4.7			1	2	3	4	5	7
6.8		1	2	3	4	5	6	8
10	1	2	3	4	5	6	7	9
15	2	3	4	5	6	7	8B	10
22	3	4	5	6	7	8B	9	11
33	4	5	6	7	8B	9	10B	
47	5	6	7	8B	9	10B	11	
68	6	7	8B	9	10B	11		
100	7	8A	9	10B	11			
150	8A	9	10B	11				
220	9	10A	11					
330	10A	11						
470	11							

NOTE: Case code 11 and Rated voltage 50VDC are for Failure rete level "M" only.

RATINGS AND CATALOG NUMBERS

Table 1

Cap. (µF)	Catalog Number	Case Code	DCL 25°C (µA)	D.F. 25°C
3.15VDC				
10.0	204 □[1] 3151 106 □[2] □[3]	1	0.4	0.06
15.0	204 □ 3151 156 □ □	2	0.4	0.06
22.0	204 □ 3151 226 □ □	3	0.6	0.06
33.0	204 □ 3151 336 □ □	4	0.8	0.06
47.0	204 □ 3151 476 □ □	5	1.2	0.06
68.0	204 □ 3151 686 □ □	6	1.7	0.06
100.0	204 □ 3151 107 □ □	7	2.5	0.08
150.0	204 □ 3151 157 □ □	8A	3.8	0.08
220.0	204 □ 3151 227 □ □	9	5.5	0.08
330.0	204 □ 3151 337 □ □	10A	8.3	0.08
470.0	204 □ 3151 477 □ □	11	11.8	0.10
6.3VDC				
6.8	204 □ 6301 685 □ □	1	0.4	0.06
10.0	204 □ 6301 106 □ □	2	0.5	0.06
15.0	204 □ 6301 156 □ □	3	0.8	0.06
22.0	204 □ 6301 226 □ □	4	1.1	0.06
33.0	204 □ 6301 336 □ □	5	1.7	0.06
47.0	204 □ 6301 476 □ □	6	2.4	0.06
68.0	204 □ 6301 686 □ □	7	3.4	0.06
100.0	204 □ 6301 107 □ □	8A	5.0	0.08
150.0	204 □ 6301 157 □ □	9	7.6	0.08
220.0	204 □ 6301 227 □ □	10A	11.1	0.08
330.0	204 □ 6301 337 □ □	11	16.6	0.08
10VDC				
4.7	204 □ 1002 475 □ □	1	0.4	0.06
6.8	204 □ 1002 685 □ □	2	0.5	0.06
10.0	204 □ 1002 106 □ □	3	0.8	0.06
15.0	204 □ 1002 156 □ □	4	1.2	0.06
22.0	204 □ 1002 226 □ □	5	1.8	0.06
33.0	204 □ 1002 336 □ □	6	2.6	0.06
47.0	204 □ 1002 476 □ □	7	3.8	0.06
68.0	204 □ 1002 686 □ □	8B	5.4	0.06
100.0	204 □ 1002 107 □ □	9	8.0	0.08
150.0	204 □ 1002 157 □ □	10B	12.0	0.08
220.0	204 □ 1002 227 □ □	11	17.6	0.08
16VDC				
3.3	204 □ 1602 335 □ □	1	0.4	0.06
4.7	204 □ 1602 475 □ □	2	0.6	0.06
6.8	204 □ 1602 685 □ □	3	0.9	0.06
10.0	204 □ 1602 106 □ □	4	1.3	0.06
15.0	204 □ 1602 156 □ □	5	1.9	0.06
22.0	204 □ 1602 226 □ □	6	2.8	0.06
33.0	204 □ 1602 336 □ □	7	4.2	0.06
47.0	204 □ 1602 476 □ □	8B	6.0	0.06
68.0	204 □ 1602 686 □ □	9	8.7	0.06
100.0	204 □ 1602 107 □ □	10B	12.8	0.08
150.0	204 □ 1602 157 □ □	11	19.2	0.08

When ordering insert "Failure Rate" in □[1], "Capacitance Tolerance" in □[2] & "Lead Style" or "Packaging Style" in □[3].

Cap. (µF)	Catalog Number	Case Code	DCL 25°C (µA)	D.F. 25°C
20VDC				
2.2	204 □[1] 2002 225 □[2] □[3]	1	0.4	0.06
3.3	204 □ 2002 335 □ □	2	0.5	0.06
4.7	204 □ 2002 475 □ □	3	0.8	0.06
6.8	204 □ 2002 685 □ □	4	1.1	0.06
10.0	204 □ 2002 106 □ □	5	1.6	0.06
15.0	204 □ 2002 156 □ □	6	2.4	0.06
22.0	204 □ 2002 226 □ □	7	3.5	0.06
33.0	204 □ 2002 336 □ □	8B	5.3	0.06
47.0	204 □ 2002 476 □ □	9	7.5	0.06
68.0	204 □ 2002 686 □ □	10B	10.9	0.06
100.0	204 □ 2002 107 □ □	11	16.0	0.08
25VDC				
1.5	204 □ 2502 155 □ □	1	0.4	0.06
2.2	204 □ 2502 225 □ □	2	0.4	0.06
3.3	204 □ 2502 335 □ □	3	0.7	0.06
4.7	204 □ 2502 475 □ □	4	0.9	0.06
6.8	204 □ 2502 685 □ □	5	1.4	0.06
10.0	204 □ 2502 106 □ □	6	2.0	0.06
15.0	204 □ 2502 156 □ □	7	3.0	0.06
22.0	204 □ 2502 226 □ □	8B	4.4	0.06
33.0	204 □ 2502 336 □ □	9	6.6	0.06
47.0	204 □ 2502 476 □ □	10B	9.4	0.06
68.0	204 □ 2502 686 □ □	11	13.6	0.06
35VDC				
0.1	204 □ 3502 104 □ □	1	0.4	0.04
0.15	204 □ 3502 154 □ □	1	0.4	0.04
0.22	204 □ 3502 224 □ □	1	0.4	0.04
0.33	204 □ 3502 334 □ □	1	0.4	0.04
0.47	204 □ 3502 474 □ □	1	0.4	0.04
0.68	204 □ 3502 684 □ □	1	0.4	0.04
1.0	204 □ 3502 105 □ □	1	0.4	0.04
1.5	204 □ 3502 155 □ □	2	0.4	0.06
2.2	204 □ 3502 225 □ □	3	0.6	0.06
3.3	204 □ 3502 335 □ □	4	0.9	0.06
4.7	204 □ 3502 475 □ □	5	1.3	0.06
6.8	204 □ 3502 685 □ □	6	1.9	0.06
10.0	204 □ 3502 106 □ □	7	2.8	0.06
15.0	204 □ 3502 156 □ □	8B	4.2	0.06
22.0	204 □ 3502 226 □ □	9	6.2	0.06
33.0	204 □ 3502 336 □ □	10B	9.2	0.06
47.0	204 □ 3502 476 □ □	11	13.2	0.06
50VDC				
0.1	204 □ 5002 104 □ □	2	0.4	0.04
0.15	204 □ 5002 154 □ □	2	0.4	0.04
0.22	204 □ 5002 224 □ □	2	0.4	0.04
0.33	204 □ 5002 334 □ □	2	0.4	0.04
0.47	204 □ 5002 474 □ □	2	0.4	0.04
0.68	204 □ 5002 684 □ □	2	0.4	0.04
1.0	204 □ 5002 105 □ □	3	0.4	0.04
1.5	204 □ 5002 155 □ □	4	0.6	0.06
2.2	204 □ 5002 225 □ □	5	0.9	0.06
3.3	204 □ 5002 335 □ □	6	1.3	0.06
4.7	204 □ 5002 475 □ □	7	1.9	0.06
6.8	204 □ 5002 685 □ □	8	2.7	0.06
10.0	204 □ 5002 106 □ □	9	4.0	0.06
15.0	204 □ 5002 156 □ □	10	6.0	0.06
22.0	204 □ 5002 226 □ □	11	8.8	0.06

SPECIFICATIONS

Operating Temperature Range: -55°C to +125°C (For operation at 125°C, derate voltage linearly to 67% of 85°C voltage rating.)
Rated Voltage: 3.15, 6.3, 10, 16, 20, 25, 35, and 50 VDC
Capacitance Range: 0.1 to 470 µF (*1)
Capacitance Tolerance: ±20% (M), ±10% (K), ±5% (J)
DC Leakage Current: 0.008 x CV or 0.4µA, whichever is greater, (Rated Voltage, 5 minutes. 25°C)
Dissipation Factor: See Table 1 (at 120Hz)

(*1) For failure rate level "N", maximum voltage range is up to 35VDC and maximum case code is 10.

Surge Voltage — Table 2

DC Rated Voltage at 85°C	3.15	6.3	10	16	20	25	35	50
DC Surge Voltage at 85°C	4	8	13	20	25	32	44	63

Capacitors shall withstand the surge voltage applied in series with a 1000 ohm resistor at the rate of ½ minute on, 5½ minutes off, for 1000 successive test cycles at 85°C. After test, capacitors shall meet the requirements in Table 3.

Table 3

Capacitance Change	Shall not change more than ±5%.
Dissipation Factor	Shall meet initial requirements in Table 1.
DC Leakage Current	Shall meet initial requirements in Table 1.

Stability at Low and High Temperatures
Capacitors shall meet the requirements in Table 4.

Table 4

TEMP	CAPACITANCE CHANGE	DC LEAKAGE CURRENT	DISSIPATION FACTOR	
-55°C	Within ±10% of initial value.	—	0.1 to 1.0µF 1.5 to 68µF 100 to 330µF 470µF	0.05 max. 0.08 max. 0.10 max. 0.12 max.
+85°C	Within ±10% of initial value.	Less than 10 times value in Table 1.	0.1 to 1.0µF 1.5 to 68µF 100 to 330µF 470µF	0.04 max. 0.06 max. 0.08 max. 0.10 max.
+125°C	Within ±15% of initial value.	0.125 x CV or 6.25µA, whichever is greater.	0.1 to 1.0µF 1.5 to 68µF 100 to 330µF 470µF	0.05 max. 0.06 max. 0.08 max. 0.10 max.

Moisture Resistance
After 1350 hours (56 days) at 40°C, 95% RH with no voltage applied, capacitors shall meet the requirements in Table 5.

Table 5

Capacitance Change	Within ±5% of initial value
Dissipation Factor	Shall meet initial requirements in Table 1.
DC Leakage Current	Shall meet initial requirements in Table 1.

Life Test
After 2000 hours at 85°C with DC rated voltage applied, capacitors shall meet the requirements in Table 6.

Table 6

Capacitance Change	Within ±10% of initial value.
Dissipation Factor	Shall meet initial requirements specified in Table 1.
DC Leakage Current:	125% max. of initial value specified in Table 1.

Flammability
Capacitor resin (plastic material) shall conform to the requirements of UL94V-0.

Terminal Strength
Capacitor leads shall withstand a pull of 2 pounds (907g) for 10 seconds and 2 bends (90°) of 1 pound (454g).

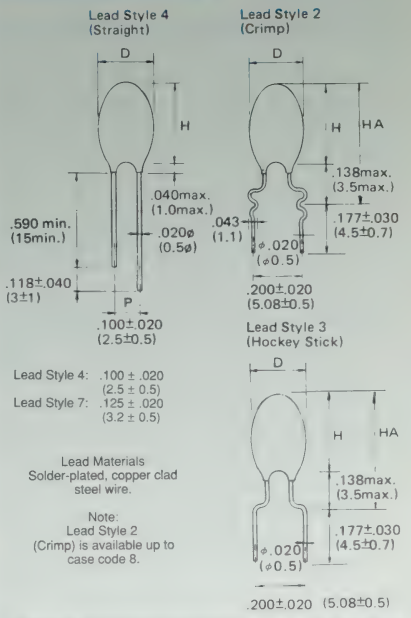
Reverse Voltage
Allowable reverse voltage is 10% of rated voltage or 0.5 volts, whichever is greater, at 25°C. At 85°C, allowable reverse voltage is 3% of rated voltage or 0.5 volts, whichever is greater.

Resistance to Soldering Heat
The optimum soldering temperature and time ranges are 270°C for 3 seconds.

For further details, refer to the latest issue of Engineering Bulletin E-100-001 A.

DIMENSIONS:

Inches (mm)



Case Code	D max.	H max.	P±.02 (0.5)
1	.142 (3.6)	.256 (6.5)	.098 (2.5)
2	.150 (3.8)	.276 (7.0)	.098 (2.5)
3	.157 (4.0)	.296 (7.5)	.098 (2.5)
4	.189 (4.8)	.315 (8.0)	.098 (2.5)
5	.197 (5.0)	.335 (8.5)	.098 (2.5)
6	.217 (5.5)	.374 (9.5)	.098 (2.5)
7	.236 (6.0)	.394 (10.0)	.098 (2.5)
8	.256 (6.5)	.453 (11.5)	.125 (3.2)
9	.295 (7.5)	.512 (13.0)	.197 (5.0)
10	.315 (8.0)	.551 (14.0)	.197 (5.0)
11	.335 (8.5)	.787 (20.0)*	.197 (5.0)

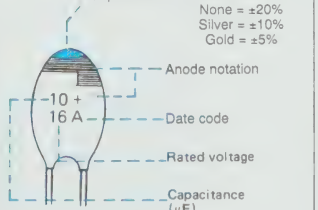
*Including the length of resin meniscus

Tape Packaging Style

Code	Lead Spacing	Polarity	Style
H	.100 + .020 (2.5 + 0.5)	(+) proceeding	Reeled
J		(-) proceeding	Reeled
G		—	Ammo
C	.200 + .020 (5.0 + 0.5)	(+) proceeding	Reeled
F		(-) proceeding	Reeled
B		—	Ammo

Notice: Tape Packaging is available up to case code 9
PACKAGING QUANTITIES: See page 15

Marking



V	Code
3.15	F
4	G
6.3	J
10	A
16	C
20	D
25	E
35	V
50	H

242

MOLDED SOLID-ELECTROLYTE TANTALUM CAPACITORS

Type 242 Molded Tantalum Capacitors are designed for use where only the best is good enough. Through better space utilization, Type 242 saves valuable "real estate" on your printed circuit board, as well as allowing for efficient cleaning around the part. The lower height helps your high density packaging. The rectangular molded case uses a high impact-resistant epoxy that has excellent physical, electrical, and moisture-resistant properties.

ELECTRICALLY, the Matsuo Type 242 has no equal. DCL is very low (0.01 x CV) and usually runs considerably below that. Rated voltage ranges from 6.3 to 50 volts and capacitances from 0.1 to 47μF. Failure rate is 1%/1000 hours 60% confidence level, ideal for all applications where quality is most important.

Some other Type 242 features you should know are:

- Close tolerance uniform lead location allows use in automatic insertion equipment.
- Ideal for noise by-passing in high-speed pulse logic circuits.
- Exhibits low impedance at high frequencies.
- Offers inherent features of Solid Tantalum Capacitors.
- Optimizes high capacitance and miniature size.
- Low leakage current.
  Highly stable performance over a wide range of frequency and temperature.
- High reliability, failure rate level M (1%/1000hr.)

Remarks:

When using for noise by-passing in high-speed pulse, refer to pages 12 & 13, Type 242 (376 Series), 244, & 245 (Built-in Fuse).

STANDARD RATINGS

RV (V) / Cap (μF)	6.3	10	16	20	25	35	50
0.1						○	○
0.15						○	○
0.22						○	○
0.33						○	○
0.47						○	○
0.68						○	○
1.0						○	○
1.5						○	○
2.2						○	○
3.3						○	○
4.7					○	○	
6.8				○		○	
10			○		○		
15		○		○			
22	○		○				
33		○					
47	○						

RATINGS AND CATALOG NUMBERS

Cap. (μF)	Catalog Number	DCL 25°C (μA)	D.F. 25°C
6.3VDC			
22.0	242M 6301 226M ☐	1.4	0.06
47.0	242M 6301 476M ☐	3.0	0.06
10VDC			
15.0	242M 1002 156M ☐	1.5	0.06
33.0	242M 1002 336M ☐	3.3	0.06
16VDC			
10.0	242M 1602 106M ☐	1.6	0.06
22.0	242M 1602 226M ☐	3.5	0.06
20VDC			
6.8	242M 2002 685M ☐	1.4	0.06
15.0	242M 2002 156M ☐	3.0	0.06
25VDC			
4.7	242M 2502 475M ☐	1.2	0.04
10.0	242M 2502 106M ☐	2.5	0.06
35VDC			
0.1	242M 3502 104M ☐	0.5	0.04
0.15	242M 3502 154M ☐	0.5	0.04
0.22	242M 3502 224M ☐	0.5	0.04
0.33	242M 3502 334M ☐	0.5	0.04
0.47	242M 3502 474M ☐	0.5	0.04

Cap. (μF)	Catalog Number	DCL 25°C (μA)	D.F. 25°C
35VDC			
0.68	242M 3502 684M ☐	0.5	0.04
1.0	242M 3502 105M ☐	0.5	0.04
1.5	242M 3502 155M ☐	0.5	0.04
2.2	242M 3502 225M ☐	0.5	0.04
3.3	242M 3502 335M ☐	1.2	0.04
4.7	242M 3502 475M ☐	1.7	0.04
6.8	242M 3502 685M ☐	2.4	0.06
50VDC			
0.1	242M 5002 104M ☐	0.5	0.04
0.15	242M 5002 154M ☐	0.5	0.04
0.22	242M 5002 224M ☐	0.5	0.04
0.33	242M 5002 334M ☐	0.5	0.04
0.47	242M 5002 474M ☐	0.5	0.04
0.68	242M 5002 684M ☐	0.5	0.04
1.0	242M 5002 105M ☐	0.5	0.04
1.5	242M 5002 155M ☐	0.8	0.04
2.2	242M 5002 225M ☐	1.1	0.04
3.3	242M 5002 335M ☐	1.7	0.04

When ordering, insert "Packaging Style (bulk, reeled or ammo)" in ☐.

SPECIFICATIONS

Operating Temperature Range: -55°C to +125°C (For operation at 125°C, derate voltage linearly to 67% of 85°C voltage rating.)
Rated Voltage: 6.3, 10, 16, 20, 25, 35, and 50 VDC
Capacitance Range: 0.1 to 47 µF
Capacitance Tolerance: ±20% (M), ±10% (K)
DC Leakage Current: 0.01 x CV or 0.5µA, whichever is greater, (Rated Voltage, 5 min. 25°C)
Dissipation Factor: See Table 1

Surge Voltage — Table 2

DC Rated Voltage at 85°C	6.3	10	16	20	25	35	50
DC Surge Voltage at 85°C	8	13	20	25	32	44	63

Capacitors shall withstand the surge voltage applied in series with a 1000-ohm resistor at the rate of 1/2 minute on, 5 1/2 minutes off, for 1000 successive test cycles at 85°C. After test, capacitors shall meet the requirements in Table 3.

Table 3

Capacitance Change	Shall not change more than ±5%.
Dissipation Factor	Shall meet initial requirements in Table 1.
DC Leakage Current	Shall meet initial requirements in Table 1.

Stability at Low and High Temperatures
Capacitors shall meet the requirements in Table 4.

Table 4

STEP	TEMP	CAPACITANCE CHANGE	DC LEAKAGE CURRENT	DISSIPATION FACTOR	
				0.1 to 4.7µF	6.8 to 47µF
1	+25°C	—	See Table 1	<0.04	<0.06
2	-55°C	Within ±10% of initial value	—	<0.04	<0.06
3	+25°C	Within ±2% of initial value	See Table 1	<0.04	<0.06
4	+85°C	Within ±8% of initial value	Less than 10 times value in Table 1	<0.04	<0.06
5	+125°C	Within ±12% of initial value	Less than 12.5 times value in Table 1	<0.05	<0.06
6	+25°C	Within ±2% of initial value	See Table 1	<0.04	<0.06

Moisture Resistance
After 500 hours (21 days) at 40°C, 95% RH with no voltage applied, capacitors shall meet the requirements in Table 5.

Table 5

Capacitance Change	Within ±5% of initial value
Dissipation Factor	Shall meet initial requirements in Table 1.
DC Leakage Current	Shall meet initial requirements in Table 1.

Life Test
After 2000 hours at 85°C with DC rated voltage applied, capacitors shall meet the requirements in Table 6.

Table 6

Capacitance Change	Within ±5% of initial value.
Dissipation Factor	Shall meet initial requirements specified in Table 1.
DC Leakage Current:	125% max. of initial value specified in Table 1.

Terminal Strength
Pull Test: Leads shall meet a tensile stress of 0.5kg.
Bend Test: 2 bends (90°) at 0.25kg.

Vibration
Capacitors shall meet the vibration resistance specified in MIL-STD-202, Method 204. (At 2000Hz, for 8 hours.)

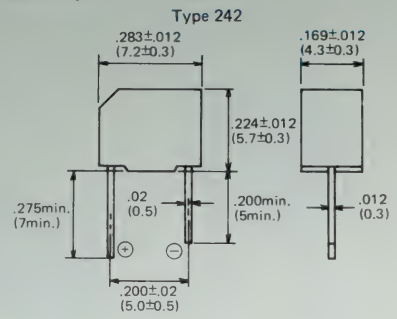
Shock
Capacitors shall meet the shock test specified in MIL-STD-202, Method 213. (At 100G.)

Resistance to Soldering Heat
The optimum soldering temperature and time ranges are 260°C for 4 seconds.

For further details, refer to the latest issue of Engineering Bulletin E-100-001 A.

DIMENSIONS
Inches (mm)

Lead Style 2

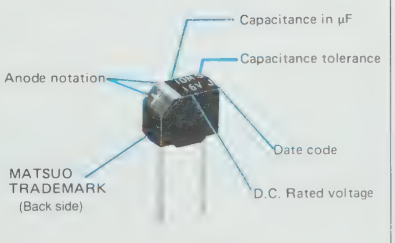


Packaging Style

Code	Polarity	Style
2	—	Bulk
C	(+) proceeding	Reeled
B	—	Ammo

PACKAGING QUANTITIES: See page 15

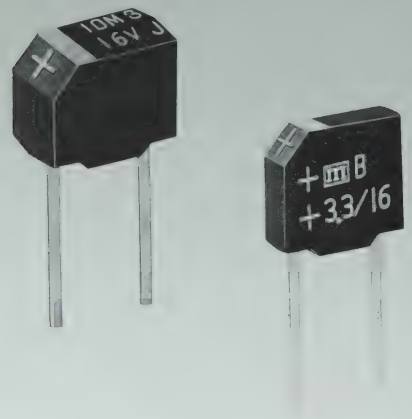
Marking



242 (376 SERIES) /244/245 (BUILT-IN FUSE)

MOLDED SOLID-ELECTROLYTE TANTALUM CAPACITORS

BY-PASS capacitors type 242 (376 Series), 244, and 245 (Built-in fuse) provide excellent performance for eliminating noise generated at the rise time of pulse in ultra high-speed logic circuits such as TTL and ECL circuits.
As for Type 245, built-in fuse functions either as thermal fuse under small current or as electric fuse under large current and eliminates burning, smoking, or resin decompotision by shorted units or misconnections.



FEATURES

- Low impedance at high frequency.
- Reduced height is suitable for high density packaging. Height = .256 inch (6.5mm) maximum.
- High reliability. Failure rate level M (1%/1000 hrs)
- Flame Retardant Resin. Conforms to UL94V-0.
- Close tolerance uniform lead location allows use in automatic insertion equipment.
- Polarity can be easily recognized by the beveled edge of the body.
- Soldering: 260°C for 4 sec. by dip.
- Packaging (Reeled & Ammo) is compatible with automatic insertion machines. (See page 14.)

RATINGS AND CATALOG NUMBERS

Type 242 (376 Series) & Type 244 for High- & Ultra High-Speed Pulse By-Passing — Table 1

VDC	Cap. (μF)	Catalog Number	DC Leakage (μA)			Dissipation Factor			Impedance (Ω) at Resonance Frequency	Features
			25°C	85°C	125°C	25°C	85°C	125°C		
16	3.3	242M 1602 335 M ☐ 376	0.5	5.0	6.6	0.04	0.04	0.05	1.2	High-speed pulse
35	1.0	242M 3502 105 M ☐ 376	0.5	5.0	6.6	0.04	0.04	0.05	1.2	
50	1.5	242M 5002 155 M ☐ 376	0.5	5.0	9.4	0.04	0.04	0.05	1.2	
16	3.3	244M 1602 335 M ☐	0.5	5.0	6.6	0.04	0.04	0.05	1.0	Ultra High-speed pulse
35	1.0	244M 3502 105 M ☐	0.5	5.0	6.6	0.04	0.04	0.05	1.0	
50	1.0	244M 5002 105 M ☐	0.8	8.0	9.4	0.04	0.04	0.05	1.0	

Type 245(Built-in fuse) for High Speed Pulse by-passing — Table 1'

VDC	Cap. (μF)	Catalog Number	DC Leakage (μA)			Dissipation Factor			Case Code
			25°C	85°C	125°C	25°C	85°C	125°C	
10	15.0	245M 1002 156 M ☐ 533	1.5	15	19	0.06	0.06	0.06	B
10	33.0	245M 1002 336 M ☐ 533	3.3	33	41	0.06	0.06	0.06	B
16	10.0	245M 1602 106 M ☐ 533	1.6	16	20	0.06	0.06	0.06	B
16	22.0	245M 1602 226 M ☐ 533	3.5	35	44	0.06	0.06	0.06	B
20	6.8	245M 2002 685 M ☐ 533	1.4	14	17	0.06	0.06	0.06	B
20	15.0	245M 2002 156 M ☐ 533	3.0	30	38	0.06	0.06	0.06	B
25	4.7	245M 2502 475 M ☐ 533	1.2	12	15	0.04	0.04	0.05	B
25	10.0	245M 2502 106 M ☐ 533	2.5	25	31	0.06	0.06	0.06	B
35	2.2	245M 3502 225 M ☐ 533	0.8	8	10	0.04	0.04	0.05	B
35	3.3	245M 3502 335 M ☐ 533	1.2	12	14	0.04	0.04	0.05	B
35	4.7	245M 3502 475 M ☐ 533	1.6	16	21	0.04	0.04	0.05	B
35	6.8	245M 3502 685 M ☐ 533	2.4	24	30	0.06	0.06	0.06	B
50	1.0	245M 5002 105 M ☐	0.5	5	6	0.04	0.04	0.05	A
50	2.2	245M 5002 225 M ☐ 533	1.1	11	14	0.04	0.04	0.05	B
50	3.3	245M 5002 335 M ☐ 533	1.7	17	21	0.04	0.04	0.05	B

for Ultra High Speed Pulse by-passing — Table 1"

VDC	Cap. (μF)	Catalog Number	DC Leakage (μA)			Dissipation Factor			Impedance (Ω) at Resonance Frequency	Case Code
			25°C	85°C	125°C	25°C	85°C	125°C		
16	3.3	245M 1602 335 M ☐	0.5	5.0	6.6	0.04	0.04	0.05	1.0	A
35	1.0	245M 3502 105 M ☐	0.5	5.0	6.3	0.04	0.04	0.05	1.0	A

SPECIFICATIONS

Operating Temperature Range: -55°C to +125°C (For operation at 125°C, derate voltage linearly to 67% of 85°C voltage rating.)

	Type 242 & Type 244	Type 245
Rated Voltage & Capacitance Range:	16VDC/3.3μF	10, 16, 20, 25, 35, 50VDC
	35VDC/1.0μF	
	50VDC/1.0 & 1.5μF	1.0 to 33.0μF

Capacitance Tolerance: ±20% (M)

DC Leakage Current: See Table 1, Table 1', Table 1'' (Rated Voltage, 5 minutes. 25°C

Dissipation Factor: See Table 1 (at 120Hz)

Surge Voltage — Table 2

DC Rated Voltage at 85°C	10	16	20	25	35	50
DC Surge Voltage at 85°C	13	20	25	32	44	63

Capacitors shall withstand the surge voltage applied in series with a 1000-ohm resistor at the rate of ½ minute on, 5½ minutes off, for 1000 successive test cycles at 85°C. After test, capacitors shall meet the requirements in Table 3.

Table 3

Capacitance Change	Shall not change more than ±5%.
Dissipation Factor	Shall meet initial requirements in Table 1.
DC Leakage Current	Shall meet initial requirements in Table 1.

Stability at Low and High Temperatures
Capacitors shall meet the requirements in Table 4.

Table 4

TEMP	CAPACITANCE CHANGE	DC LEAKAGE CURRENT	DISSIPATION FACTOR
-55°C	Within ±10% of initial value	See Table 1	See Table 1
+85°C	Within ±8% of initial value	See Table 1	See Table 1
+125°C	Within ±12% of initial value	See Table 1	See Table 1

Moisture Resistance
After 500 hours at 40°C, 90/95% R.H. with no voltage applied, capacitors shall meet the requirements in Table 5.

Table 5

Capacitance Change	Within ±5% of initial value
Dissipation Factor	Shall meet initial requirements in Table 1.
DC Leakage Current	Shall meet initial requirements in Table 1.

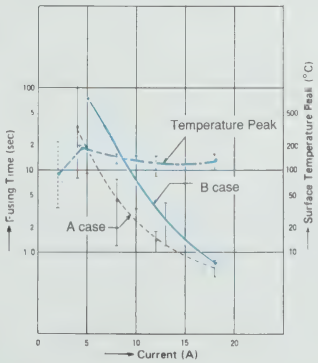
Life Test
After 2000 hours at 85°C with DC rated voltage applied, capacitors shall meet the requirements in Table 6.

Table 6

Capacitance Change	Within ±5% of initial value.
Dissipation Factor	Shall meet initial requirements specified in Table 1.
DC Leakage Current:	Shall meet initial requirements specified in Table 1.

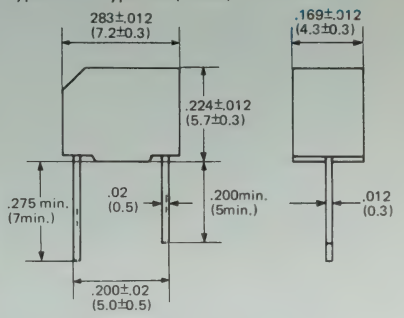
Explanation of Fusing Characteristics
As shown in Figure 1, the built-in fuse functions as a thermal fuse when there is a current of less than 5 amperes and the temperature of the capacitor is kept under 200°C. The built-in fuse also functions as an electrical fuse when the current exceeds 5 amperes.

FUSING CHARACTERISTICS (TYPE 245) Fig. 1

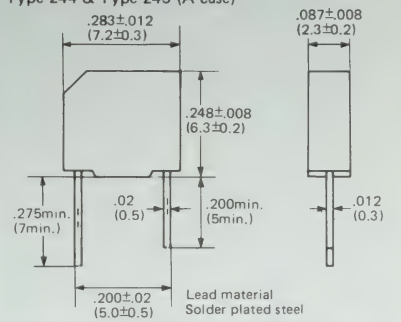


DIMENSIONS
Inches (mm)

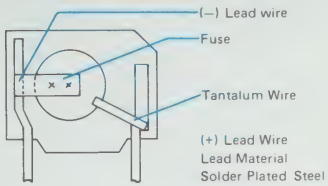
Type 242 & Type 245 (B case)



Type 244 & Type 245 (A case)



Construction of Fuse Connection (Type 245)



PACKAGING QUANTITIES: See page 15

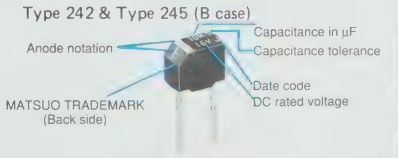
Packaging Style

Code	Polarity	Style
*2	—	Bulk
C	(+) proceeding	Reeled
B	—	Ammo

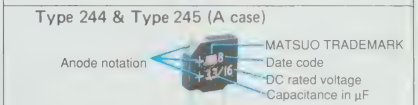
*For Type 242 only. No code needed for Types 244 & 245

Marking

Type 242 & Type 245 (B case)



Type 244 & Type 245 (A case)

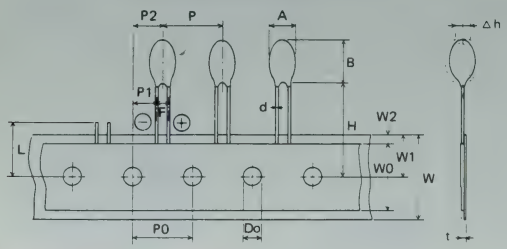


For further details, refer to the latest issue of Engineering Bulletin E-100-001 A.

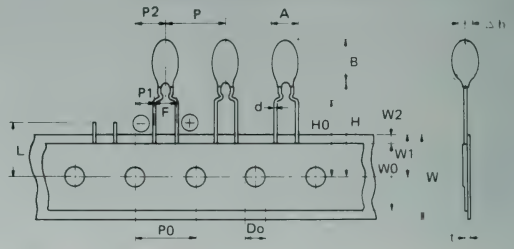
PACKAGING FOR AUTOMATIC INSERTION and MOUNTING

Type 202 & 204 (Radial Lead)

Lead Spacing .100±.020 (2.5±0.5)



Lead Spacing .200±.020 (5.0±0.5)



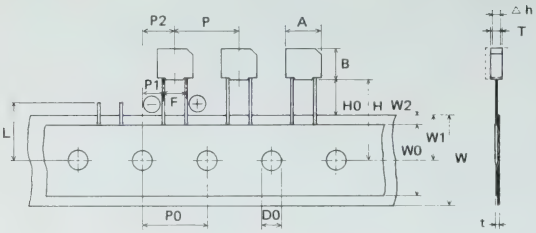
DIMENSIONS: Inches (mm)

Item	Symbol	Specifications	
		Value	Tolerance
Body diameter	A	See Dimensions Table	
Body height	B		
Lead wire diameter	d	.020 (0.5)	.002 (0.05)
Pitch of component	P	.500 (12.7)	.039 (1.0)
Feed hole pitch	P0	.500 (12.7)	.012 (0.3)
Feed hole center to lead	P1	.200 (5.1)	.020 (0.5)
Hole center to component center	P2	.250 (6.35)	.039 (1.0)
Lead to lead distance	F	.098 (2.5)	+.031 (0.8) -.008 (0.2)
Component alignment	△h	0	.039 (1.0)
Tape width	W	.709 (18.0)	.020 (0.5)
Hold down tape width	W0	.374 (9.5) minimum	
Hole position	W1	.354 (9.0)	.020 (0.5)
Hold down tape position	W2	.098 (2.5) maximum	
Height of component from tape center	H	.787 (20.0)	.020 (0.5)
Feed hole diameter	D0	.157 (4.0)	.008 (0.2)
Total tape thickness	t	.028 (0.7)	.008 (0.2)
Length of snipped lead	L	.433 (11.0) maximum	

DIMENSIONS: Inches (mm)

Item	Symbol	Specifications	
		Value	Tolerance
Body diameter	A	See Dimensions Table	
Body height	B		
Lead wire diameter	d	.020 (0.5)	.002 (0.05)
Pitch of component	P	.500 (12.7)	.039 (1.0)
Feed hole pitch	P0	.500 (12.7)	.012 (0.3)
Feed hole center to lead	P1	.152 (3.85)	.020 (0.5)
Hole center to component center	P2	.250 (6.35)	.039 (1.0)
Lead to lead distance	F	.197 (5.0)	+.031 (0.8) -.008 (0.2)
Component alignment	△h	0	.039 (1.0)
Tape width	W	.709 (18.0)	.020 (0.5)
Hold down tape width	W0	.374 (9.5) minimum	
Hole position	W1	.354 (9.0)	.020 (0.5)
Hold down tape position	W2	.098 (2.5) maximum	
Lead wire clinch height	H0	.630 (20.0)	.020 (0.5)
Feed hole diameter	D0	.157 (4.0)	.008 (0.2)
Total tape thickness	t	.028 (0.7)	.008 (0.2)
Length of snipped lead	L	.433 (11.0) maximum	
(Height of component from tape center)	(H)	.787 (20.0)	

Type 242, 244, & 245 (Radial Lead)



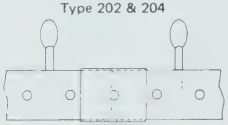
DIMENSIONS: Inches (mm)

Item	Symbol	Specifications	
		Value	Tolerance
Body diameter	A	See Dimensions Table	
Body height	B		
Pitch of component	P	.500 (12.7)	.039 (1.0)
Feed hole pitch	P0	.500 (12.7)	.012 (0.3)
Feed hole center to lead	P1	.152 (3.85)	.020 (0.5)
Hole center to component center	P2	.250 (6.35)	.020 (0.5)
Lead to lead distance	F	197 (5.0)	+.031 (0.8) -.008 (0.2)
Component alignment	△h	0	.039 (1.0)
Tape width	W	.709 (18.0)	.020 (0.5)
Hold down tape width	W0	.374 (9.5) minimum	
Hole position	W1	.354 (9.0)	.020 (0.5)
Hold down tape position	W2	0~0.39 (1.0)	
Height of component from tape center	H	.630 (16.0)	.020 (0.5)
Lead wire clinch height	D	.276 (7.0)	.002 (0.5)
Feed hole diameter	D0	.157 (4.0)	.008 (0.2)
Total tape thickness	t	.028 (0.7)	.008 (0.2)
Length of snipped lead	L	.433 (11.0) maximum	

Tape Splicing Tape shall be joined by pressure sensitive adhesive tape.

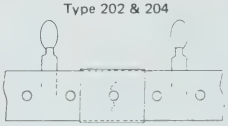
Lead Spacing .100±.020 (2.5±0.5)

Type 202 & 204

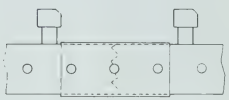


Lead Spacing .200±.020 (5.0±0.5)

Type 202 & 204



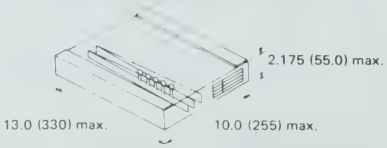
Type 242, 244 & 245



Housing of Taped Component Type 202, 204, 242, 244 & 245

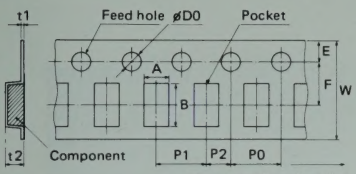
Reeled Package

Ammo Package

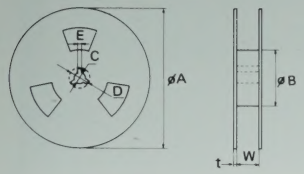


Reeled Package

Tape Dimensions (See Table 1)



Reel Dimensions (See Table 2)



DIMENSIONS: Inches (mm)

Type	Case Code	A±.004 (0.1)	B±.004 (0.1)	W±.012 (0.3)	F±.002 (0.05)	E±.004 (0.1)	P1±.004 (0.1)	P2±.002 (0.05)	P0±.004 (0.1)	øD+.004 (0.1) -0	T1 max. max.	T2 max
267 267E 269 277	A	.075 (1.9)	.138 (3.5)	.315 (8.0)	.138 (3.5)	.069 (1.75)	.157 (4.0)	.079 (2.0)	.157 (4.0)	.059 (1.5)	.024 (0.6)	*.083 (2.1)
	B	.130 (3.3)	.150 (3.8)	.315 (8.0)	.138 (3.5)	.069 (1.75)	.157 (4.0)	.079 (2.0)	.157 (4.0)	.059 (1.5)	.024 (0.6)	*.094 (2.4)
	C	.142 (3.6)	.236 (6.0)	.472 (12.0)	.222 (5.65)	.059 (1.5)	.315 (8.0)	.079 (2.0)	.157 (4.0)	.059 (1.5)	.024 (0.6)	.110 (2.8)
	C3	.146 (3.7)	.252 (6.4)	.472 (12.0)	.217 (5.5)	.069 (1.75)	.315 (8.0)	.079 (2.0)	.157 (4.0)	.059 (1.5)	.024 (0.6)	.122 (3.1)
	D	.193 (4.9)	.236 (6.0)	.472 (12.0)	.222 (5.65)	.059 (1.5)	.315 (8.0)	.079 (2.0)	.157 (4.0)	.059 (1.5)	.024 (0.6)	.150 (3.8)
	D3	.189 (4.8)	.303 (7.7)	.472 (12.0)	.224 (5.7)	.059 (1.5)	.315 (8.0)	.079 (2.0)	.157 (4.0)	.059 (1.5)	.024 (0.6)	.142 (3.6)
	E	.240 (6.1)	.303 (7.7)	.472 (12.0)	.217 (5.5)	.069 (1.75)	3.15 (8.0)	.079 (2.0)	.157 (4.0)	.059 (1.5)	.024 (6.0)	.157 (4.0)

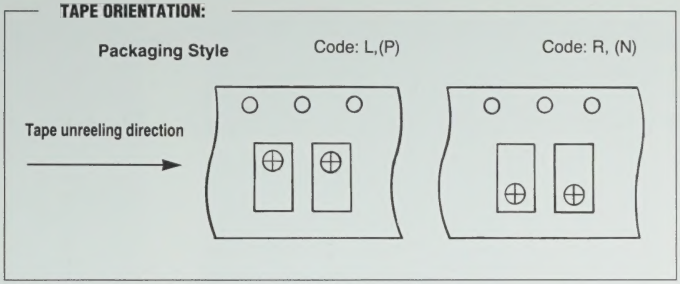
*Type 277: .067 (1.7) max.

DIMENSIONS: Inches (mm)

Type	Case Code	øA±.079 (2.0)	øB min.	øC±.031 (0.5)	øD±.031 (0.8)	E±.020 (0.5)	W±.059 (1.5)	t±.020 (0.5)
267 267E 269 277	A,B	*7 (178)	1.969 (50)	.512 (13.0)	.827 (21.0)	.079 (2.0)	.394 (10.0)	.079 (2.0)
	C, C3, D, D3 & E	*7 (178)	1.969 (50)	.512 (13.0)	.827 (21.0)	.079 (2.0)	.551 (14.0)	.079 (2.0)

* Also, available on 13" reels.

TAPE ORIENTATION:



STANDARD PACKAGING QUANTITIES

TYPE	LEAD SPACE	TAPE & REEL	TAPE & AMMO
202	0.100"±.020 (2.5±0.5)	H (+) proceeding	G
		J (-) proceeding	
	0.200"±.020 (5.0±0.5)	C (+) proceeding	B
		F (-) proceeding	
204			
242			
244			
245			

NOTES:

TYPES 202 & 204:

*EXCEPTIONS: 20V/4.7µF 1,000 pcs.
35V/2.2µF 1,000 pcs.

#available type 204 only..
(50V parts are available up to case size 6.)

TYPE 242, 244, & 245
.200" available with straight lead only.

QUANTITY PER PACKAGE (202/204)		
CASE SIZE	TAPE & REEL	TAPE & AMMO
1	2,000 pcs	2,000 pcs
2	2,000	2,000
3	*2,000	2,000
4	1,000	2,000
5	1,000	2,000
6	1,000	1,000
7	1,000	1,000
8	#1,000	1,000
9	#500	—
10	—	—

QUANTITY PER PACKAGE		
TYPE & C/S	TAPE & REEL	TAPE & AMMO
242	1,000 pcs	1,000 pcs
244	2,000	2,000
245 CASE A	2,000	2,000
245 CASE B	2,000	1,000

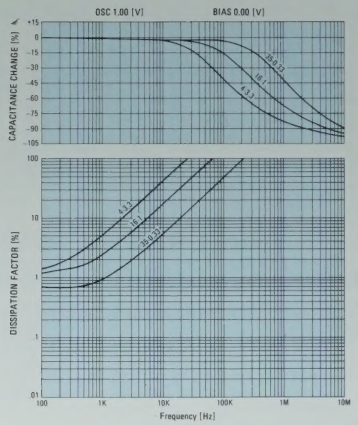
TYPE	CASE	7" REEL	13" REEL
PACKAGING CODE		R, (L)	N, (P)
267 267E 269	A	2,000 pcs	9,000 pcs
	B	2,000	8,000
	C	500	3,000
	C3	500	3,000
	D	500	2,500
	D3	500	2,500
	E	500	2,000
277	A	3,000	12,000
	B	3,000	12,000

※ FREQUENCY CHARACTERISTICS

CAPACITANCE & DISSIPATION FACTOR VS. FREQUENCY

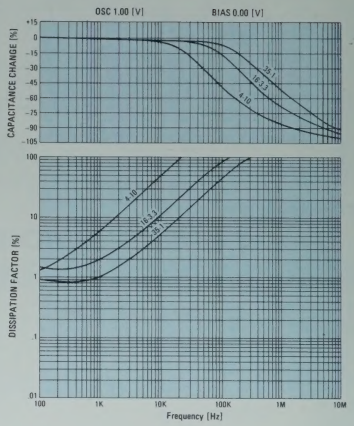
Case Size A

4V - 3.3μF
16V - 1.0μF
35V - 0.33μF



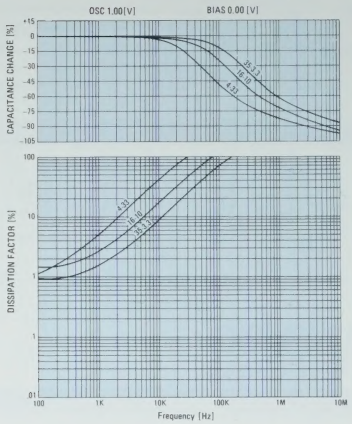
Case Size B

4V - 10μF
16V - 3.3μF
35V - 1.0μF



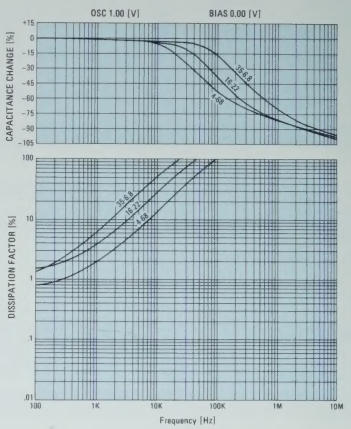
Case Size C and C3

4V - 33μF
16V - 10μF
35V - 3.3μF



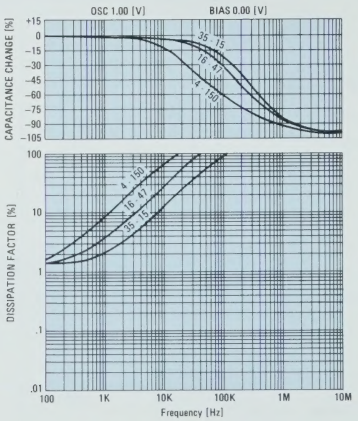
Case Size D and D3

4V - 68μF
16V - 22μF
35V - 6.8μF



Case Size E

4V - 150μF
16V - 47μF
35V - 15μF

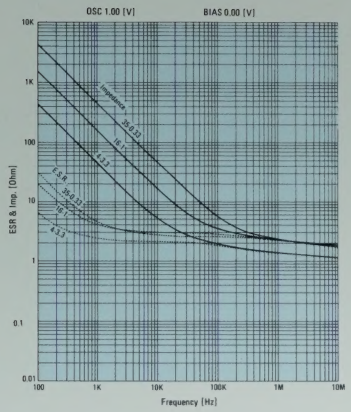


※ FREQUENCY CHARACTERISTICS

ESR VS. FREQUENCY
IMPEDANCE VS. FREQUENCY

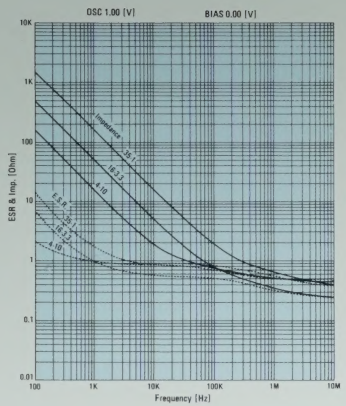
Case Size A

4V - 3.3μF
16V - 1.0μF
35V - 0.33μF



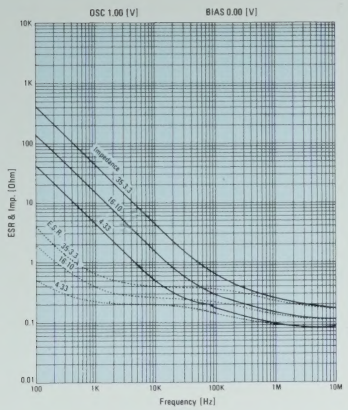
Case Size B

4V - 10μF
16V - 3.3μF
35V - 1.0μF



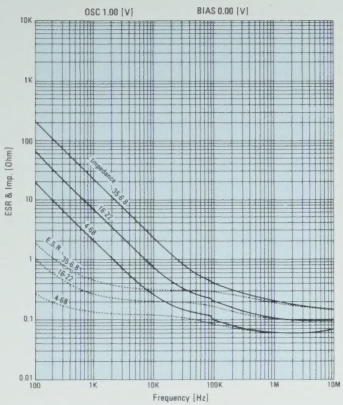
Case Size C and C3

4V - 33μF
16V - 10μF
35V - 3.3μF



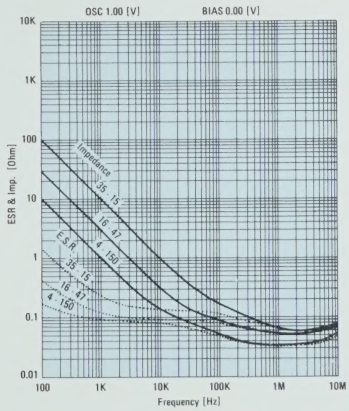
Case Size D and D3

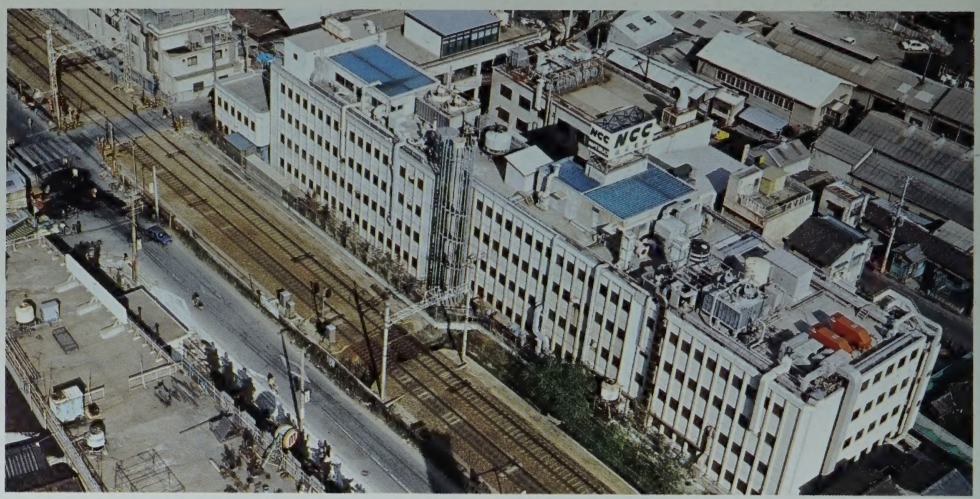
4V - 68μF
16V - 22μF
35V - 6.8μF



Case Size E

4V - 150μF
16V - 47μF
35V - 15μF





Main Plant and Head Office (Osaka)

Fukuchiyama Plant (Kyoto)

MATSUO
ELECTRONICS
2134 Main St., Ste. 200 • Huntington Beach, CA 92648 • (714) 969-2491/FAX (714) 960-6492

REPRESENTED BY:

Exclusive Agent
HATCH ASSOCIATES, INC.
999 N. Main St.
Randolph, MA 02368
Phone (617) 963-3306 Fax (617) 963-2266

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